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THE BACILLUS AEROGENES CAPSULATUS.**

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AN OBSCURE CASE OF PURPURA HÆMORRHAGICA WITH
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It may be said that the great majority of cases of purpura are obscure. While we may observe the clinical aspects of such cases and classify them according to outstanding features presented by this case or by that, yet there come, and these not infrequently, cases conforming to no type. On the other hand a given case manifests classifying points of a variety of cases during the course of its development. Obscure must they remain until by the aid of added research some ætiological factors are discovered, some certain basis of classification established.

The case which is here reported has some of the clinical features of those described and designated by Hænoch as "purpura fulminans" but it differs from them in its duration and in its hæmorrhagic features.

T. S., æt. 22, student in arts at McGill University, was admitted to the Royal Victoria Hospital on the morning of Nov. 7th, 1896, complaining of spitting of small quantities of blood and of spots over his body.

He was a well developed and a well nourished young man. He had never resided outside his native province, Quebec. His health had been good with the exception of sickness due to measles, mumps, whooping-cough and chicken-pox in his childhood. Besides the eruptions due to these diseases he described a bright red itchy papular eruption which came out in the spring of 1895. This became pustular in part and disappeared at the end of four weeks. The history is altogether negative, touching the points of hæmophilia, malignant disease, previous attacks, rheumatism, venereal disease, use of drugs, alcohol, tobacco and privation. It seems probable from his statements concerning his family that tuberculosis affects one brother. Beyond recurring hæmoptysis in this member and an attack of hæmatemesis in a paternal aunt there was no evidence of hæmorrhagic diathesis.

History of onset and condition of patient.—On Nov. 2nd, without any premonitory malaise, a few bright red spots of the size of a pin's head were first noticed about the left ankle. From this time until the next evening they became numerous over both the lower extremities. Three days afterward a few spots were observed on the arms, then the chest showed similar areas, the abdomen remaining free until after the 7th. A slight knock at any part induced the appearance of extensive and severe bruising. So far as can be ascertained the patient was not feeling ill or weak during these four days, but in the night of the fourth day he was awakened by flowing of blood from mouth and with coughing and spitting up blood.

On the afternoon of the following day, 7th, he lost large quantities of blood, from nose, mouth and throat, and for the first time felt weakness, rawness of the throat and slight pains in the knees.

Examination of surfaces.—There were the spots already referred to, which were distinctly hæmorrhagic. Besides these small hæmorrhages, which were most numerous on the lower extremities, there were those of similar size on the face, neck and trunk, the abdomen possessing least. Here and there appeared larger purpuric areas varying in size and colour. In a large dark red patch on the left arm two nodules about the size of a pea were noticed. The conjunctivæ presented a few hæmorrhages. The nose was slowly but constantly bleeding. The lips were of good colour. The gums were not spongy. On the soft palate and left tonsil hæmorrhagic areas were seen. The pharynx was congested; there was no glandular enlargement except at the angle of jaws.

The constitutional condition.—Mentally the patient was clear: Temperature $102\frac{2}{3}$, pulse 100, respiration 24.

The blood, etc.—Cultures on agar-agar and in broths were negative microscopically. A few (1 or 2) days before death, the blood showed lymphocytes as the chief form of leucocyte, but one polynuclear cell being found in a search over three sides. Blood count r. c. 4,840,000, w. c. 6,000, hæmoglobin 87%. The circulatory, respiratory and digestive as well as urinary systems were all negative at the primary examination. Ocular fundi negative.

Progress of case.—The patient was under observation for five days, during which a constant and remarkable increase in the gravity of the case was noted—in the varying temperature, quickening and weakening pulse, in the persistent and intractable hæmorrhages, both sub-cutaneous and from the mucous membranes, in the occurrence of hæmaturia, hæmoptysis, hæmatemesis and melæna, and in the sloughy appearance about the palate and œdema about the conjunctivæ and

eye lids. Finally delirium supervened a short time previous to death, which occurred on the morning of Nov. 13th, eleven days after the first spots had been noticed about the ankles and seven days after the occurrence of nasal hæmorrhage and admission to the hospital.

The treatment consists in large doses of fluid extract of ergot at first and then the B. P. solution of chloride of lime. These measures did not seem to influence the hæmorrhages in any way.

The clinical points which present chief interest in this case are :

1. The extreme severity of the disease.
2. The febrile temperature.
3. The similarity of the clinical picture to one of an acute infection.

The severity of the case is manifest in the degree of prostration and the early fatal termination, for, from the loss of good health till the time of his death, but eight days elapsed.

Of the whole temperature course we are not able to speak positively but its range was from 99° to 104° and when admitted on the first day of mucous membrane hæmorrhages it was found as high as 102.4° . Such a temperature, while it may suggest the presence of some specific fever, may certainly be accounted for by the course of purpura hæmorrhagica alone. But apart from the temperature curve we wish to observe that here the primary event was the occurrence of hæmorrhages, spontaneous hæmorrhage as already recorded, being first observed about the ankles and right elbow, the young man meanwhile going about without feeling weakness or illness. Then the constitutional symptoms supervened, fever, prostration, delirium.

The striking similarity that such forms of purpura hæmorrhagica bear to that of an acute infectious process has been long since recognised and numerous clinical observers have commented upon it while pathologists have investigated several cases with this thought before them. There is this, however, to be noted, as is well known, that in infectious fevers and exanthemata proper the appearance of the characteristic eruption follows rather than precedes the febrile and constitutional symptoms.

In this case the autopsy was made within 10 hours after death. The body presented the general appearances of death. An extensive purpuric eruption was observed with large areas of subcutaneous hæmorrhages looking like bruises. Some of these measured from 11 c. m., to 17 c. m., in length, while others were about the size of a ten cent piece. There were no ringed spots. The petechiae bore no special relation to the hair follicles.

The head was not examined. The heart showed numerous small ecchymotic areas as well on the visceral as on the parietal pericardium.

while fresh blood-stained fluid to the amount of 30 c. c. was found in the pericardium.

The vessels on the surface of the heart were injected with air, giving the ventricle a peculiar glistening appearance. There appeared to be some interstitial emphysema as well. The right auricle especially was distended with gas. The right ventricle was flabby and somewhat dilated. The left ventricular muscle showed areas of necrosis and subendocardial hæmorrhages were observed. The aorta was small and relatively thin. The valves were normal while the great vessels showed mixed clots which were frothy.

The lungs presented sub-pleural ecchymoses, both recent and old with several interstitial hæmorrhages. The vessels of the lungs contain air mixed with blood.

But little gas escaped on opening the abdomen. The intestines were greatly distended with gas. The mesentery of the lower part of the ileum contained a hæmorrhagic area. In the gastric mucosa numerous hæmorrhages were seen while the contents of the stomach were bile- and blood-stained.

The duodenum was intensely injected and the rugae swollen, the remaining portion of the small intestine presenting an appearance much the same. Peyer's patches showed no changes.

In the lower part of the ileum a few patches of congestion were seen with one large area about 7 c. m. long covered by a false membrane with ecchymoses both within and about it. This area corresponds to the area of ecchymosis noticed on the peritoneal surface in the mesentery, as above described.

The cæcum and transverse colon were greatly congested. In this part as well as in the rest of the colon were extensive submucous ecchymoses. The contents of this viscus were blood-stained and of the consistence of porridge. The rectum presented submucous hæmorrhages.

The liver floated easily in water; it was friable in places, emphysematous and somewhat spongy at parts. The surface was smooth except where air bullæ were plainly visible. The gall-bladder contained thick black bile.

The spleen was small, dry and flabby. Air was seen within the vessels and it floated just beneath the water surface. The pancreas was congested though not visibly hæmorrhagic.

The suprarenals were of fair size with softened medulla.

The left kidney sank slowly in water. Its parenchyma was somewhat degenerated. There were a few sub-capsular ecchymoses. The right kidney floated. In this organ more degeneration was seen and

the hæmorrhagic areas were more numerous. The bladder contained some frothy urine. There were seen numerous submucous hæmorrhages. The walls were thin.

Coverslip preparations made from the blood in the inferior vena cava showed the presence of enormous numbers of a large encapsulated bacillus undistinguishable from the *Bac. aerogenes capsulatus*, which seemed to be in pure culture.

Cultures were made at the time of the autopsy from the various organs. From the blood deep lactose agar cultures showed gas formations at the end of 36 hours and the presence of the *B. aerogenes capsulatus*. Smear cultures on agar of heart, spleen, kidney and liver gave the staphylococcus pyogenes aureus, while cultures from the spleen gave a bacillus smaller than the colon bacillus, whose length was generally about four times its breadth but presenting considerable variability, sometimes appearing as a small diplo-bacillus. Sections of the various organs showed abundant collections of the *B. aerogenes capsulatus*. In the kidney and liver rarer minute bacilli, corresponding to that isolated from the spleen, were to be recognised. A pure culture of this small bacillus injected into the rabbit (1 cm. intravenously) led to death in 14 days. For several days previously the animal was noticed to be becoming more and more emaciated; then paresis set in, beginning in the hind limbs and becoming general. Already by the fifth day the hind limbs could not be used. During the last twenty-four hours the animal showed fairly frequent convulsions. Pure cultures from the peritoneal cavity of the rabbit into a white mouse (0.25 cm.) led to death of the animal in forty-eight hours. However, neither in the rabbit nor in the mouse were there any ecchymoses or signs of a purpuric condition.

Conclusions:—1. From the history and the course of the case it is hardly possible that the bacillus *aerogenes capsulatus* was the primary infection.

2. It is quite possible that the staphylococcus pyogenes aureus was primary. There is no conclusive evidence of such however, since examination of the tissues showed no large collection of the cocci in any of the organs, nor again were there any typical abscesses anywhere.

On the other hand we know that this form is a frequent inhabitant of the intestines and this, like the bacillus *aerogenes capsulatus* may invade the tissues from the erosions in the intestinal mucosa.

3. Concerning the third form again nothing definite can be said, for while somewhat similar forms have been described occurring with purpura, inoculations of pure cultures into lower animals in this case,

while leading to their death were entirely unassociated with any evidences of purpura.

While this case is interesting as showing a somewhat unusual complication of acute purpura hæmorrhagica and while so little is known of the ætiology of this form of disease that every case deserves to be placed on record, yet it cannot be said that this careful bacteriological study leads us any further or throws any light on the causation of the condition.

The chief and apparently the oldest area of disturbance internally was the area of diphtheritic inflammation in the ileum. But nevertheless it may be doubted from clinical history whether this was the primary seat of the disease, for the history shows that for two or three days the patient had subcutaneous hæmorrhages with scarcely any disturbance of the general health. Then it was only with the appearance of mucous membrane hæmorrhages that the temperature became elevated and from this point it would appear that the secondary infection may be traced which ended evidently by affording a point of entrance to the bacillus ærogenes capsulatus with the resulting tissue changes in the heart and other organs as above described.

The question whether cases of morbus maculosus are cases of hæmorrhage due to some specific origin is unanswered, and the relation between the various forms of purpura hitherto classified as idiopathic must yet remain in obscurity.

In preparing this report we have been greatly helped by Prof. Adami who furnished us with a report of the autopsy and directed the bacteriological study.

